

WHAT IS CLAIMED IS:

1. A polishing pad for chemical-mechanical polishing comprising a thermoplastic polyurethane foam with an average pore size of about 50 μm or less, wherein the thermoplastic polyurethane has a Melt Flow Index (MFI) of about 20 or less, a molecular weight of about 50,000 g/mol to about 300,000 g/mol, and a polydispersity index of about 1.1 to about 6.
2. The polishing pad of claim 1, wherein the polyurethane foam has a Flexural Modulus of about 350 MPa to about 1000 MPa.
3. The polishing pad of claim 1, wherein the thermoplastic polyurethane has a Rheology Processing Index of about 2 to about 10 at a shear rate of about 150 l/s and a temperature of about 205 $^{\circ}\text{C}$.
4. The polishing pad of claim 1, wherein the thermoplastic polyurethane has a glass transition temperature of about 20 $^{\circ}\text{C}$ to about 110 $^{\circ}\text{C}$ and a melt transition temperature of about 120 $^{\circ}\text{C}$ to about 250 $^{\circ}\text{C}$.
5. The polishing pad of claim 1, wherein the polyurethane foam has an average % compressibility of about 7 or less, an average % rebound of about 35 or greater, and a Shore D hardness of about 40 to about 90.
6. The polishing pad of claim 1, wherein the polyurethane foam further comprises a polymer resin selected from the group consisting of thermoplastic elastomers, thermoplastic polyurethanes, polyolefins, polycarbonates, polyvinylalcohols, nylons, elastomeric rubbers, styrenic polymers, polyaromatics, fluoropolymers, polyimides, cross-linked polyurethanes, cross-linked polyolefins, polyethers, polyesters, polyacrylates, elastomeric polyethylenes, polytetrafluoroethylenes, polyethyleneterephthalates, polyimides, polyaramides, polyarylenes, polystyrenes, polymethylmethacrylates, copolymers and block copolymers thereof, and mixtures and blends thereof.
7. The polishing pad of claim 1, wherein the polyurethane foam further comprises a water-absorbent polymer.

8. The polishing pad of claim 7, wherein the water-absorbent polymer is selected from the group consisting of cross-linked polyacrylamide, cross-linked polyacrylic acid, cross-linked polyvinyl alcohol, and combinations thereof.

9. The polishing pad of claim 1, wherein the polyurethane foam further comprises particles selected from the group consisting of abrasive particles, polymer particles, composite particles, liquid carrier-soluble particles, and combinations thereof.

10. The polishing pad of claim 9, wherein the polyurethane foam further comprises abrasive particles selected from the group consisting of silica, alumina, ceria, and combinations thereof.

11. The polishing pad of claim 1, wherein the polyurethane foam has a void volume of about 25% or less.

12. The polishing pad of claim 1, wherein the polyurethane foam comprises closed cells.

13. The polishing pad of claim 1, wherein the polyurethane foam has an average pore size of about 40 μm or less.

14. The polishing pad of claim 1, wherein the polyurethane foam has a cell density of about 10^5 cells/cm³ or greater.

15. The polishing pad of claim 1, wherein the polyurethane foam has a bimodal pore size distribution.